Runoff Nitrogen Levels from Two Alabama Nurseries

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Nature of Work: The nursery industry has often been targeted as a source for nonpoint source pollution. In 1987 the EPA mandated states to address agricultural (nursery industry included) nonpoint source pollution problems and to implement management plans (1). Two wholesale container nurseries, one located in north Alabama and one in south Alabama were monitored during 1997 for nitrate-nitrogen (NO_3-N) levels. Sample locations at the north Alabama nursery were: irrigation water pumped from a retention basin, bed runoff prior to entering a grass filter strip, bed runoff exiting grass filter strip, and a collection pond. Sample locations at the south Alabama nursery were: irrigation water pumped from a deep well, bed runoff, collection pond, and leaving the property. Samples at both nursery locations were collected after designated irrigation events (1, 4, 8, 24, and 48) following fertilizer application. Irrigation at both nurseries was applied using overhead impact heads; application amount for each event was from 0.7 to 0.8 inches. Nutricote 20-7-10 fertilizer was applied at the north Alabama nursery on June 19, and Sierra 17-7-10 fertilizer was applied at the south Alabama nursery applied on July 9. Fertilizer was applied as a top-dress according to manufacture's recommendations at both locations. Triplicate water samples were collected at each event. After collection, all samples were placed in a cooler, iced, transported to the laboratory, and frozen for later nitrogen analysis. Nitrogen analysis was conducted with a WesCan Model 360 Ammonia Analyzer (2).

Results and Discussion: All samples at both nursery locations had NO_3-N levels below the 10 mg ($liter^{-1}$ maximum contaminate level as mandated by the 1974 Safe Drinking Water Act, for public water systems. At the south Alabama nursery, runoff water NO_3-N levels were reduced an average of 84 percent in the collection pond and 99 percent as the water overflowed the pond and left the property compared to bed runoff (figure 1). At the north Alabama nursery, runoff water NO_3-N levels were reduced from an average of 7.0 mg • $liter^{-1}$ prior to entering grass filter strip, to 4.7 mg •$liter^{-1}$ upon exiting the grass filter strip. This amounts to a 33 percent reduction (figure 2). No NO3-N levels were detected in the collection pond at the north Alabama nursery. These data support previous research showing runoff water levels below 10 mg ($liter^{-1}$ in critical locations: wells, collection ponds and leaving the property (3).

Significance to Industry: This study demonstrates the positive impact selected best management practices have in reducing NO_3-N levels in runoff water. Use of controlled release fertilizers resulted in runoff water at both nurseries with NO_3-N levels less than 10 mg • $liter^{-1}$ at all sample dates. These data tend to disconfirm the perception that nursery runoff water contains high NO_3-N levels. Collection ponds and grass filter strips can be important best management practices to further reduce NO_3-N levels in nursery runoff water.

Literature Cited:

1. Baker, D.B. 1989. Environmental extension: A key to nonpoint-source pollution abatement. J. of Soil and Water Conser. 44:8.

2. Carlson, R.M. 1986. Continuous flow reduction of nitrate to ammonia with granular zinc. Anal. Chem. 58:1590-1591.

3. Fare, D.C., C.H. Gilliam, G.J. Keever, J. Olive, and J.C. Stevenson. 1991. Nitrogen levels in irrigation effluent from container nurseries. Proc. South. Nur. Assoc. Res. Conf. 36:81-83.

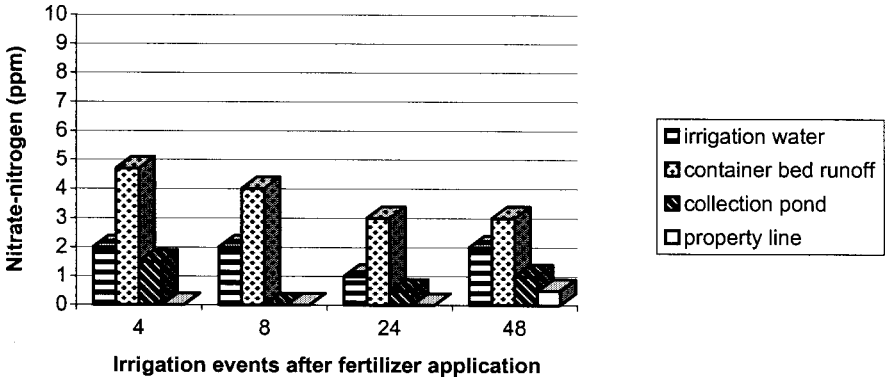

Figure 1. Runoff water Nitrate-nitrogen levels at a south Alabama container nursery.

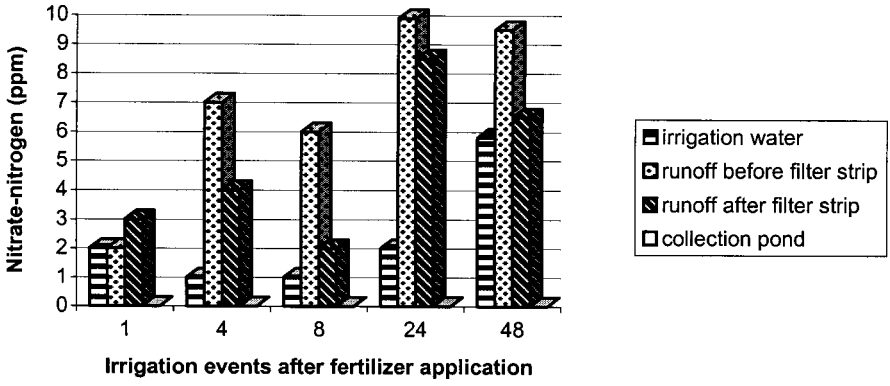

Figure 2. Runoff water Nitrate-nitrogen levels at a north Alabama container nursery.